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The effect of mask use on allergic rhinitis symptoms during COVID-19 pandemic

Sakine Nazik Bahçecioğlu[1], Hale Ateş[2], İlkay Koca Kalkan[2], Kurtuluş Aksu[1], Şenay Demir[1], Musa Topel[3], Selma Yeşilkaya[1]

[1]Department of Immunology and Allergy, Atatürk Sanatoryum Training and Research Hospital, Ankara, Turkey
[2]Department of Immunology and Allergy, Ankara Etlik City Hospital, Ankara, Turkey
[3]Department of Immunology and Allergy, Dr Burhan Nalbantoğlu Hospital, Lefkoşa, Turkish Republic of Northern Cyprus

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ABSTRACT

Aims: Inspiratory particle load including the allergens in the inhaled air is decreased by the use of the mask, which is one of the methods for COVID-19 protection. The aim of the study is to investigate the effect of masks used by seasonal allergic rhinitis patients with pollen allergy on the control of rhinitis symptoms.

Methods: Mask usage characteristics of patients (mask type used, average number of days per week for mask usage, daily usage time),whether there was a change in the time spent outdoors during the pandemic compared to the pre-pandemic period, and rhinitis complaints and frequency of rhinitis-related drug use before the pandemic compared to the pandemic period were investigated.

Results:The frequency of nasal discharge (6.62±1.69; 6.00±1.89: p<0.001), obstruction (4.56±1.64; 4.28±1.86: p=0.099), itching(7.49±1.55; 7.16±1.83: p=0.038), sneezing (5.54±1.60; 5.21±1.89: p=0.046), and frequency of drug use (5.52±1.62; 5.17±1.91: p=0.037) decreased statistically significantly after the pandemic according to the visual analog scoring. However, an increase was found in ocular symptoms.

Conclusion:Although studies with larger patient and control groups are needed, we think that the use of face masks during the COVID-19 pandemic is an effective protective measure for protection from pollen in patients with allergic rhinitis,who have pollen sensitivity.

Keywords: Mask usage, allergic rhinitis, COVID-19, rhinitis symptoms, pandemic

INTRODUCTION

At the end of December 2019, a series of reports of upper respiratory tract infections were noticed from Wuhan city of China.[1] In a short time, the coronavirus disease 2019 (COVID-19) has affected the whole world and by the date June 13, 2023 the number of cases reached 767,750,853 worldwide.[2] COVID-19 is mainly transmitted via droplets from the nose and mouth mucosa that include viruses.[3] Exposure of eyes, mouth, or nose to droplets or inhalation of airborne viruses after coughing or sneezing are considered as common transmission mechanisms.[4] Washing hands with soap and water, using hand disinfectant, not touching face and eyes, avoiding social contact with people who have flu symptoms, and using personal protective equipment (face masks, eye protection) are among the COVID-19 protective measures.[4,5] Inspiratory particle load including the allergens in the inhaled air is decreased by the use of the mask, which is one of the protective measures for COVID-19 protection.[6] While standard surgical masks filter particles larger than 3 µm, N95 respirator masks can filter as small as 0,04 µm.[7,8]

Rhinitis can be classified by pathogenic mechanisms, as allergic or non-allergic. Allergic rhinitis is viewed as either seasonal or perennial, and it is the classification system that the United States Food and Drug Administration uses when approving new medications for allergic rhinitis.[9] Allergic rhinitis is characterized by one or more symptoms including sneezing, nasal itching, nasal obstruction and discharge,[10] if ocular symptoms are also present it is identifies as allergic rhinoconjunctivitis.[11] Allergic rhinitis is an inflammatory state caused by an IgE-mediated response to a variety of environmental aeroallergens, including pollen (10-100 µm), house dust mites (10-40 µm), and fungal spores (2-50 µm).[9] The key to diagnosis of allergic rhinitis is awareness of

Corresponding Author: Sakine Nazik Bahçecioğlu, sakinenazik@gmail.com

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symptoms of the patient. Allergic rhinitis has negative economic, clinical and social consequences. It can cause work day loss in adults, school day loss and learning difficulties in children.[12] There are not enough studies on its prevalence. Studies have shown that the prevalence of allergic rhinitis varies between 10% and 58,5% according to the geographical regions.[13] A 2020 study revealed a 15,9% allergic rhinitis prevalence in Turkey.[14]

Allergen avoidance and control of environmental exposure are the most important steps in the treatment of allergic rhinitis. Complete avoidance of allergen is usually not feasible or practical. The use of masks is also among the methods of protection in pollen-sensitive allergic rhinitis patients.[13] In the pandemic, with the introduction of regular mask use into our lives, investigating the effect of mask use on many diseases has become possible. Since the pandemic, controversial results regarding mask use and rhinitis symptoms have been reported in the literature. Although there are publications that report a decrease in the severity of rhinitis symptoms with mask use,[15] there are also publications reporting an increase in rhinitis symptoms with mask use.[4]

The aim of the study is to investigate the effect of masks used by seasonal allergic rhinitis patients with pollen (10-100 µm) sensitivity on the control of rhinitis symptoms.

METHODS

Ethics

The ethical approval of the study was obtained from the Keçiören Training and Research Hospital Clinical Researches Ethics Committee. (Date: 11/05/2021, Decision No: 15/2301). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Study Design and Participants

Patients with allergic rhinitis who were admitted to the Health Sciences University Ankara Atatürk Sanatoryum Training and Research Hospital Immunology and Allergy Diseases Outpatient Clinic between May-November 2021, who were over 18 years of age and had only pollen allergy in the skin prick test, had no change in their place they live in the last 3 years and had seasonal complaints for at least 2 years were included in the survey study after an informed consent form was obtained. Patients had complaints before the pandemic and the complaints patients before using the mask were compared with the 2020 season retrospectively.

Data Collection

Demographic features and mask usage characteristics of patients (mask type used, average number of days per week for mask usage, daily usage time), whether there was a change in the time spent outdoors during the pandemic compared to the pre-pandemic period, and rhinitis complaints and frequency of rhinitis-related drug use before the pandemic compared to the pandemic period were investigated. Patients were asked to rate their rhinitis symptoms according to the visual analog scoring (grading from 0 to 10 and scoring, 0: no complaints, 10: the most intense complaint) and score their complaints (nasal sneezing, nasal itching, nasal obstruction, nasal discharge, watering eye, swollen eyes, eye itching) considering both pre-pandemic period and during the pandemic period while using a mask. Sneezing, nasal itching, nasal obstruction, and rhinorrhea and watering eye, swollen eyes, eye itching) scoring was requested. In addition, patients were asked to score the frequency of drug use, both for pre-pandemic and pandemic periods, using visual analog scoring.

Statistical Analysis

SPSS (statistical package for social sciences) for Windows 25 program was used for statistical analyses performed for the evaluation of the study data. For the evaluation of the normally distributed data, mean and standard deviation, for data that does not show normal distribution, median and interquartile range and percentages for rates were calculated as descriptive statistical methods. Chi-square, Fisher, Student's t-test, and Mann-Whitney U tests were used for the univariate analyses where appropriate. The results were evaluated with a 95% confidence interval and the significance value was accepted as $p<0.05$.

RESULTS

A total of 171 patients, 87 females and 84 males were included in the study. Demographic characteristics of the patients are given in **Table 1**. All of the patients had a history of seasonal allergic rhinitis confirmed by the skin prick test and had only pollen sensitivity in the skin prick test.

Table1. Demographic characteristics of the patients.

	n=171
Female, n (%)	87 (50.8)
Age,years, mean±SD	28.9±7.01
Allergic rhinitis duration, years, mean±SD	5.4±2.49

The type of mask that all patients preferred to use during 2020 in the COVID-19 pandemic was the surgical mask (n=171, 100%). The frequency of mask usage by patients is given in **Table 2**.

Table 2. Frequency of mask usage

Frequency within a week, n (%)	1 day - 51 (29.8) 2-3 day - 44 (25.7) 4.5.6 day - 64 (37.4) Everyday - 12 (7.0)
Frequency within a day, n (%)	Less than 1 hour- 49 (28.6) 1-5 hours - 36 (21) >5- 8 hours - 76 (44.4) More than 8 hours - 10 (5.8)

The frequency of nasal discharge, itching, sneezing, and frequency of drug use decreased statistically significantly after the pandemic according to the visual analog scoring. There was also decrease in nasal obstruction but it was not statistically significant. However, an increase was found in ocular symptoms (watering eyes, swollen eyes, itching eyes) (**Table 3**). When compared to the pre-pandemic period, there was no change in the time spent outdoors in 59.06% (n=101) of the patients, while there was a decrease in the time spent outdoors of 22.80% (n=39) patients, and there was an increase in the time spent outdoors in 18.12% (n=31) of the patients.

Table 3. Comparison of rhinitis complaints and frequency of drug use before and during the pandemic period by Visual Analog Scoring.

Variable	Before Pandemic	During Pandemic	p value
Nasal symptoms			
Discharge, mean ±SD	6.62±1.69	6.00±1.89	<0.001
Obstruction, mean±SD	4.56±1.64	4.28±1.86	0.099
Sneezing, mean±SD	5.54±1.60	5.21±1.89	0.046
Itching, mean±SD	7.49±1.55	7.16±1.83	0.038
Ocular symptoms			
Watering eye, mean±SD	2.25±1.86	2.447±2.18	0.003
Swollen eyes, mean±SD	2.18±1.84	2.42±2.21	0.002
Itching eyes, mean±SD	3.00±2.10	3.24±2.57	0.008
Drug use			
Frequency of drug use(daily)±mean SD	5.52±1.62	5.17±1.91	0.037

DISCUSSION

In the current study, we showed that using masks reduced the symptoms of allergic rhinitis and decreased the patients need for use of medication of the 171 patients included in the study.

Treatment of allergic rhinitis includes control of environmental exposure by allergen avoidance, pharmacotherapy, and immunotherapy. One of the most important steps in the treatment is explaining the recommendations for allergen avoidance to the patients and compliance of the patient.[13] Avoiding pollen is more difficult than avoiding other allergens. Pollen avoidance is only relevant during the time that the offending pollen is airborne. Using the face masks in the pollen period, which is among the protective measures of pollen protection, was not a method commonly preferred by patients before the pandemic, however, face masks are being used quite commonly during the pandemic.[13,15] Considering that standard surgical masks filter particles larger than 3 µm, theoretically, it is thought that they can easily filter pollen between 10-100 µm in size. In our study, it is also thought that this may be the mechanism in patients with statistically significant regression was detected in nasal symptoms. During the use of a mask, exhaling into the mask increases the temperature and humidity of the inhaled air between the mouth and the mask.[16] There are publications showing that the nasal response to the allergen may decrease with increased temperature and humidity.[15] In other words, the symptoms of allergic rhinitis can be reduced by the mask, by both physical filtration and suppression of the nasal response, while the response to allergens that cannot be filtered by the mask is also decreased.

There was no significant decrease in the ocular symptoms of the patients, as in the nasal symptoms, and even a statistically significant increase was detected. We think that this may be related to the fact that while the face masks protect the airways from inspiratory particles, the conjunctiva of the eye is still exposed to allergens. Similar to our study, Drorr et al.[15] also detected that nasal symptoms of patients with allergic rhinitis decreased, while ocular symptoms were not decreased. We think that the increase in the ocular symptoms of the patients may be due to the decrease in the frequency of drug use because of the decrease in nasal symptoms, compared to the previous year.

Although there was no change in the time spent outdoors in a large percentage of the patients (59.06%), the decrease in the nasal symptoms of the patients suggests that this condition is related to the decrease in allergen exposure by wearing a mask, not by not going out. In addition, while there was a decrease in nasal symptoms of the patients, the absence of the same decrease in ocular symptoms suggests that this decrease is due to using masks rather than lockdown.

CONCLUSION

although studies with larger patient and control groups are needed, we think that the use of face masks during the COVID-19 pandemic is an effective protective measure for protection from pollen in patients with allergic rhinitis, who have pollen sensitivity.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Keçiören Training and Research Hospital Clinical Research Ethics Committee. (Date: 11/05/2021, Decision No: 15/2301)

Informed Consent: Written consent was obtained from the patient participating in this study

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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